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XCI. *An Historical Memoir concerning a Genus of Plants called Lichen, by Micheli, Haller, and Linnæus ; and comprehended by Dillenius under the Terms Usnea, Coralloides, and Lichenoides : Tending principally to illustrate their several Uses. Communicated by Wm. Watson, M. D. F. R. S.*

— *Natura nihil frustra creaverit. posteros tamen tot inventuros utilitates ex Muscis auguror, quot ex reliquis vegetabilibus.*

Cui bono? Amæn. Acad. III. p. 241.

Read Apr. 27 &
May 4, 1758.

THE whole class of mosses were taken but very little notice of by the revivers of botany in the sixteenth century: they indeed took some pains to distinguish the particular species that the ancients had mentioned, but disregarded almost all the rest. Modern botanists however suppose, that they were but little successful in general in their application of the ancient names to plants: nor is a failure in such attempts to be wondered at, considering the too great conciseness, and frequent obscurity, of their descriptions. In the class of mosses, as in many others, the accounts transmitted to us are little more than a scene of uncertainty and confusion.

It is to the moderns we are indebted for the discovery of the far greater number of the plants of this class.

clafs. In this branch of botany our own countrymen Mr. Ray, Buddle, Dale, Doody, Petiver, and Dr. Morison, Sherard, Richardson, and others, have distinguished themselves: and amongst foreigners M. Vaillant, Sig. Micheli, and the very eminent Dr. Haller: but, beyond all, the late learned and indefatigable professor at Oxford, Dr. Dillenius, has herein made the most ample discoveries and improvements, of which his elaborate history will ever remain a standing proof.

The word *lichen* occurs in the writings of Dioscorides and Pliny; and tho' it may be doubtful, there is nevertheless good reason to apprehend, that Dioscorides meant to describe under that name the very plant, or at least one of the same genus, to which the commentators agreed to affix his description. Since then the name has been variously applied by different authors: on which account it is necessary to premise, that the *lichen sive hepatica Off.* or liverwort of the shops, does not fall under this generical term, as it is now formed by the three above-named authors. They comprehend under the term *Lichen*, and Dillenius under those of *Usnea*, *Coralloides*, and *Lichenoides*, the hairy tree-moss or *usnea* of the shops; the *muscus pulmonarius*, tree-lungwort, or oak-lungs; the *lichen terrestris cinereus*, or ash-coloured ground liverwort; the coralline-mosses; the cup-mosses; horned mosses; the *orchel*, or Canary-weed; the *muscus islandicus* of Bartholine; and a multitude of others found upon trees, walls, rocks, and stones, in all parts of the world, and in many parts thereof in very great abundance.

Caspar Bauhine in his *Pinax*, John Bauhine, and
our

countrymen Gerard and Parkinson, and their contemporaries, as they wrote before the time that generical characters in botany were in use, included these lichens among the other herbaceous mosses, under the general name of *muscus*; adding to the name in general some epithet descriptive of its form, place of growth, or supposed virtue.

Mr. Ray, both in his History of Plants, and in the Supplement, as he was usually averse to the forming of new names, has interspersed them among other mosses, under the character of *musci steriles seu aspermi*, retaining the synonyms of the two Bauhines, Gerard, and Parkinson, to the general species.

Dr. Morison seems to have been the first, who separated them intirely from the herbaceous mosses; and, from the analogy he supposed they had with the fungus tribe, formed them into a genus, under the name of *musco-fungus*. He enumerates fifty species and upwards under this term in the *Historia Oxoniensis*, and has divided them into five orders, according to their different appearances, as follows :

1. *Musco-fungi e terra prominentes, latiores.* 5.
2. *Musco-fungi pixidati.* 11.
3. *Musco-fungi corniculati.* 26.
4. *Musco-fungi crustæ modo adnascentes.* 37.
5. *Musco-fungi corticibus arborum dependentes.* 53.

Table the 7th of his 15th section exhibits several good figures of some of these lichens.

Tournefort was the first, who adapted the generical term *lichen* to them; but it was in consequence of his joining them to the lichen of the shops. He has however excluded the coralline-mosses, and

forms them into a genus, by the name of *coralloides* ; to which he has connected some plants, properly of the fungus tribe. In this distinction he is followed by Dr. Boerhaave in his *Index alter Plantarum*.

Dr. Dillenius first called them *lichenoides*, in the catalogue of plants growing about Gießen, chusing to retain the word *lichen* to the liverwort of the shops. Under this name however, in this work, he does not comprehend the *usneæ*, or hairy tree-mosses, but refers them to the *confervæ*, adding the epithet *arborea* to each species, to distinguish them from the water kinds. He enumerates upwards of sixty species of *lichenoides*, but has applied few or no synonyms to them.

Under the same generic term he has introduced them into the third edition of Ray's Synopsis of British Plants, taking in the *usneæ*, and recounting upwards of ninety species, all found spontaneously growing in England. Many of these are undoubtedly only varieties. They are in this work very naturally divided into several orders and subdivisions, for the greater ease of distinguishing them, as follows :

Lichenoides	{	caulifera	{	1. Capillacea et non tubulosa scutellata.	{	a. Solida et non tubulosa.
				2. Coralliformia tuberculosa plerumque.		b. Tubulosa.
			{	3. Pyxidata.		
				4. Fungiformia.		
	{	cauliculis destituta	{	1. Mere crustacea.	{	a. Substantiæ generatim latinosæ.
				2. Crusta foliosa scutellata seu foliis scutellatis arcte adnascantibus -		b. Substantiæ durioris.
			{	3. Foliis magis liberis nec tam arcte adnascantibus	{	a. Scutellatis et tuberculatis.
						b. Peltatis.

M. Vaillant, in the *Botanicon Parisiense*, retains Tournefort's names. Many of these lichens, as well as other mosses, are accurately represented in the elegant tables, which adorn that work. Dr. Haller tells

tells us he learnt to distinguish almost all the mosses solely by the help of these tables, so well are they expressed. The lovers of botanic science are greatly indebted to Boerhaave for his publication of that work.

Micheli, after Tournefort, adopts the term *lichen*, and comprehends all the species under it, except one or two, which he calls *lichenoides*. This author however does not take into this genus the liverwort of the *materia medica*; he describes the species of that genus under the name of *marchantiæ*. Near twenty of the plates in his *Nova Plantarum Genera* are taken up in representing various species of this genus. In this work they are divided into thirty-eight orders or subdivisions; a circumstance very necessary indeed, considering how greatly he has multiplied the number of the species. It is to be regretted, that so indefatigable an author, one whose genius particularly led him to scrutinize the minuter subjects of the science, should have been so solicitous to increase the number of species under all his genera: an error this, which tends to great confusion and embarrassment, and must retard the progress and real improvement of the botanic science.

Dr. Haller retains Micheli's term, and enumerates 160 kinds in his *Enumeratio Stirpium Helvetiæ*: he divides them into seven orders, according to the following titles:

1. *Lichenes corniculati & pixidati.*
2. *Lichenes coralloidei.*
3. *Lichenes fruticosi alii.*
4. *Lichenes pulmonarii.*
5. *Lichenes crustacei scutis floralibus ornati.*
6. *Lichenes scutellis ornati.*
7. *Lichenes crustacei non scutati.*

The extensive number of the species, and the difficulty of distinguishing them with a tolerable degree of certainty, has deterred Dr. Haller from adding so full and complete a list of synonyms to the plants of this genus as he has elsewhere done in that splendid work. Plate the 2d exhibits several elegant sorts of these lichens.

Linnaeus, and the followers of his method, who seem to have established their generical character from Micheli's discoveries, retain also his generical title. Micheli's passion for the multiplication of species is no-where more conspicuous than in the plants of this genus, which he has most enormously augmented to the number of 298 species. The Swedish professor cannot be charged with this foible: it is one of the excellencies of his writings, that they inculcate the reverse. He has so far retrenched this genus, that in his general enumeration of plants he recounts only eighty species belonging to it. They are in this work divided into eight orders, according to the difference of appearance which they form by their *facies externa*, little or no regard being had to what are usually called the parts of fructification.

- | | |
|---|---------------------------------|
| 1. <i>Lichenes leprosi tuberculati.</i> | 5. <i>Lichenes coriacei.</i> |
| 2. <i>Lichenes leprosi scutellati.</i> | 6. <i>Lichenes scyphiferi.</i> |
| 3. <i>Lichenes imbricati.</i> | 7. <i>Lichenes fruticulosi.</i> |
| 4. <i>Lichenes foliacei.</i> | 8. <i>Lichenes filamentosi.</i> |

Dr. Dillenius, in his most elaborate work, intituled, *Historia Muscorum*, has divided this Michelian genus into three, under the names of *usnea*, *coralloides*, and *lichenoides*. Under the word *usnea* he comprehends the hairy tree-mosses, among which are the *usnea* of

the shops, and the true *usnea* of the Arabians. Of these he describes sixteen species. Under *coralloides* he describes thirty-nine species, among which are the cup-mosses, and many others, disposed according to the following scheme:

Ordo I. *Fungiformia, non tubulosa, nec ramosa*. 5.

Ordo II. *Scyphiformia, tubulosa, simplicia et prolifera*.

Series 1. *Scyphis perfectioribus*. 13. Cup-mosses.

Series 2. *Scyphis imperfectis*. 20. Horned mosses.

Ordo III. *Ramosa fruticuli specie summitatibus acutis multifariam divisis*.

Series 1. *Species tubulosæ*. 30. Tubulous coralline mosses.

Series 2. *Species solidæ*. 39. Solid coralline mosses; among which is the *orchel*.

The genus of *lichenoides* contains 135 species, disposed according to the following scheme:

Ordo I. *Species aphyllæ mere crustaceæ*. { 1. *Tuberculosæ*. 8.
2. *Scutellatæ*. 18.

Ordo II. *Species foliosæ*. { 1. *Gelatinosæ tuberculosæ et scutellatæ*. 35.
2. *Aridiores et exsuccæ, scutellatæ*. 100.
3. *Aridiores peltatæ et clypeatæ*. 121.

These plants are not only largely described, and accompanied with the most perfect assemblage of synonyms; but every species is accurately figured, and many of them in various views, and at different ages of their growth; by which this laborious work, notwithstanding it is conversant upon the minutest, and

consequently the most abstruse parts of botany, may nevertheless be justly esteemed, without any exaggeration, one of the most complete works extant of the kind.

Dr. Hill, in his History of Plants, has disposed them into five genera, under the following names: 1. *Usnea*, comprehending the hairy tree-mosses; 2. *Platyisma*, flat-branched tree-mosses, the lungwort, and others; 3. *Cladonia*, containing the orchel and coralline-mosses; 4. *Pyxidium*, the cup-mosses; 5. *Placodium*, the crustaceous mosses.

The plants of this extensive genus are very different in their form, manner of growing, and general appearance: on which account those authors, who preserve them under the same name, saw the propriety and necessity of arranging them into different orders and subdivisions, that the species might be distinguished with greater facility. Upon the same principle Dr. Dillenius and Dr. Hill have formed them into several genera.

So far as the parts of fructification are distinguishable in these plants, they appear in different forms upon different species: on some, in the form of tubercles; on others, in the form of little concave dishes, called *scutellæ*; on others, of oblong flat shields or pelts. All these are conceived by Micheli and Linnæus to be receptacles of male flowers. The female flowers and seeds are suspected by the same authors to be dispersed in the form of farina or dust upon the same plants, and in some instances on separate ones. Dillenius has not dared to determine any thing positively with regard to the real parts of fructification in these lichens: time will hereafter, it is to be hoped, throw more light upon the subject.

In order to convey a more distinct idea of the several plants of this genus, which enter into æconomical or medical uses in the various parts of the world, we shall distribute them into several orders, according to the custom of former writers: and as is not consistent with our plan to describe each of these species, we shall refer to the page of the more modern authors, where they may be found.

1. Lichenes filamentosi.

Such as consist of mere solid filaments, of a firm and solid but flexible texture, having the appearance of fructification in the form of scutellæ, or flat round bodies growing from the sides or extremities of these filaments.

This order or division comprehends the hairy tree-mosses, or *usnea* of Dillenius and Hill; several of the species of the fifth order of lichens of Micheli; and the *lichenes filamentosi* of Linnæus.

Dr. Dillenius describes sixteen species under the term *usnea*, several of which are found in England, tho' some of them, as the common *usnea* of the shops, but very sparingly, and none of them in any considerable plenty. The thick woods in many other parts of Europe, and the rest of the globe, afford them in great plenty. They hang from the branches of various kinds of trees, like large tufts of hair, to a considerable length: some species grow several feet long. The rocks on the tops of high mountains afford several kinds. They are of various colours; some whitish, ash-coloured, others grey or blackish, and two or three species have a yellow or orange hue.

The

The commentators in general agreed in making the *bryon* of (1) Dioscorides one of these hairy tree-mosses, which they called *usnea*. No wonder, therefore, that at the restoration of letters it became a matter of controversy, which of them was the *usnea* of the ancients. Dioscorides recommends his as an astringent; and tells us, that “the best grew upon the cedar; but that from whatever tree it was gathered, the whitest and most fragrant was preferable to the black.” The several *usneæ* would undoubtedly in different countries be found upon different trees. In Italy, that of the larch-tree was the most odoriferous; and on that account Matthioli (2) preferred it to all others. That kind, which at length obtained a place in the shops as the *usnea* of the ancients, was a species commonly found in our countries on old oaks and other trees, and is called by Dillenius (3) stringy tree-moss, or *usnea* of the shops. Many excellent virtues have been ascribed to it, on a supposition of its being the true *usnea*; but it does not appear to have deserved them: and the present practice, at least in England, has quite expunged it, and that perhaps very justly.

Dr. Dillenius is evidently of opinion however, that this common *usnea*, tho’ it obtained a place in the shops as such, is not the *bryon* of Dioscorides and Pliny, or the *phædon* of Theophrastus, since he has

(1) Lib. i. c. 20. See this subject largely discussed in Bodæus à Stapel Comment. in Theoph. p. 156. et seq.

(2) Opera omnia à C. B. edit. 1598. p. 64.

(3) *Usnea vulgaris loris longis implexis* Hist. Musc. p. 56. *Lichen plicatus* Lin. Sp. Pl. 1154. *Muscus arboreus*: *Usnea* Officin. C. B. Raii Syn. III. p. 64.

applied these names from those fathers of botany to another species, which he calls the *beard usnea* (4). Nor does either of these species appear to be the true *usnea* of the Arabians, whatever title they may seem to have to it, either from their colour or smell. Bel- lonius, as he is quoted by Dr. Dillenius, tells us, “ that the true *usnea*, or *bryon*, as he calls it, is sold “ at Constantinople under the name of *usneck*; and “ tells us we are deceived in believing ours to be “ the true *usnea*.” Dillenius has therefore described another species (5), which he received from the East Indies, from Madagascar, and St. Helen’s, as the *Usnea Arabum*. This plant the Indians call *saliaga*; and Camelli assures us, that, while fresh, it has a very fragrant musk-smell. He adds, that he had himself experienced what Serapio says of it; *viz.* that a vi- nous infusion of it restrains fluxes, stops vomiting, strengthens the stomach, and induces sleep.

The common *usnea* of the shops was said to be the basis of that fine perfumed powder, which the French called *corps de cypre gris*, and which formerly made a great article of trade at Montpellier. Dr. Brown hints (6), that the perfumers use it still; but he does not add, where. John Bauhine gives us the whole process (7) for making that power, which was vended in great quantities to all parts of France. It

(4) *Usnea barbata loris tenuibus fibrosis* Hist. Musc. p. 63. *Li- chen barbatus* Lin. Sp. Pl. 1155. *Quercus excrementum villosum* C. B. p. 422. Bauhine took this to be the true *Usnea Arabum*.

(5) *Usnea ceratoides candicans glabra et odorata* Hist. Musc. p. 71. *Muscus arboreus candicans et odorifer* Camelli Raii Hist. III. Ap- pend. p. 3.

(6) Civil and Natural History of Jamaica, p. 80.

(7) Hist. Plant. I. par. ii. p. 88.

is nevertheless true, that other of the lichens had as great a share in the composition as the *usnea*; as the demand for that powder could not have been answered, if the makers had confined themselves to the *usnea* alone. It was necessary too, inasmuch as other species are equally well adapted to the same uses (8).

This *usnea* is abundantly plentiful in the woods of Lapland; and Linnæus (9) relates, that the inhabitants apply it to their feet, when they are sore and excoriated with much walking. The benefit they receive from it in this case is undoubtedly owing to its styptic quality, which is remarked by Matthioli, and by Mr. Ray (10) from the German Ephemerides.

The *beard usnea* before mentioned, which is abundantly common upon the trees both in the northern regions of Europe and America, as well as in the eastern kingdoms, and is described by Mr. Ray as hanging to the length of two feet, the filaments of which are not thicker than a common thread, and of a greenish white colour, is used by the inhabitants of Pennsylvania to dye an orange colour with. This information Dillenius received from Mr. Bartram.

The black *mane usnea*, which grows in vast quantities in the Lapland woods, in a defect of the common coralline moss makes part of the fodder, and is equally acceptable to the rein-deer in the winter time (11).

(8) Flor. Lap. p. 342. ε. Flor. Suec. Ed. II. p. 416.

(9) Flor. Lap. p. 348.

(10) Hist. Plant. I. p. 115.

(11) *Usnea jubata nigricans*, Dillen. Hist. Musc. p. 64. *Lichen jubatus* Lin. Sp. Pl. 1155. *Muscus corallinis saxatilis fœniculaceus*, Rock-hair. Raii Syn. III. p. 65. n. 7.

The long beaded *usnea*, or necklace-moss (12), enters into the like æconomical uses in Virginia, where it is very plentiful. The inhabitants find it a very agreeable fodder in the winter season to both sheep and cows (13).

The Norwegians appropriate one of these *usnea* to a singular use. Pontoppidan tells us (14), “ they have a certain kind of yellow moss hanging on the branches of trees of the firs and pines, which is very venomous, yet applied to a necessary use ; for being mixed in pottage, or with flesh, as a bait for the wolves, they infallibly die of it.” That the species here referred to is the brass-wired *usnea* of Dillenius (15), or the *lichen vulpinus* of Linnæus, cannot be doubted, since this last author mentions (16) the same application of it with very little variation. In England it is very rare ; in Sweden plentiful, especially in the province of Smoland, where the natives dye woollen goods yellow with it.

John Bauhine describes a very beautiful species, under the name of *laricus muscus* (17), which gives a very elegant citron colour upon chewing, or upon maceration in water. Dillenius is doubtful, whether this is what he has described under the name of the orange-coloured forked *usnea* (18).

(12) *Usnea capillacea et nodosa* Dillen. Hist. Musc. 60. *Muscus arboreus nodosus* C. B. p. 361. Raii Syn. III. p. 65, n. 4.

(13) Raii Hist. Pl. III. p. 28.

(14) Natural History of Norway, p. 148.

(15) *Usnea capillacea citrina frutriculi specie*. Hist. Musc. p. 73; *Muscus aureus tenuissimus* Merret. Pin. p. 79. Raii syn. p. 65, n. 8.

(16) Flor. Suec. Ed. II. p. 427.

(17) Hist. Plant. III. P. ii. lib. 9. p. 273.

(18) *Usnea dichotoma compressa segmentis capillaceis teretibus*. Hist. Musc. 72. *Muscus arboreus aurantiacus flaminibus tenuissimis* Pluk. Alm. p. 254. Raii Hist. III. 28.

We may here observe by the bye, that the *usnea cranii humani*, which thro' the influence of superstition formerly obtained a place in the catalogues of the *materia medica*, does not belong to this division of the lichens. The writers of those times distinguished two kinds of *usnea humana*, under the names of *crustacea* and *villosa*. Any of the crustaceous lichens, but more properly the common grey-blue pitted *lichenoides* of Dillenius, was used for the former of these; and, as Dale tells us, was held in most esteem. The *villosa* was a species of the genus of *hypnum*. Indeed it does not appear, that they were in those days very curious in determining the exact kind; and doubtless any moss, which happened to grow upon an human skull, was sufficient for the purposes designed.

2. Lichenes fruticulosi.

Such as consist of a tough flexible matter, formed into ramifications, in some species almost simple, in others resembling small shrubs: in some of the species the branches are quite solid, in others tubular.

This order comprehends the third of Dillenius's genus of *coralloides*; the whole *cladonia* of Hill; the second, and several species of the third order of Haller's lichens; several species of the fifth, and the whole sixth, order of Micheli; and the *lichenes fruticulosi* of Linnæus.

The plants of this genus grow principally upon the ground on heaths, forests, and mountainous bar-

ren places ; except the *orcelle*, or Canary-weed, which is found upon the rocks on the sea-coast.

To this division belongs the horned moss (19). It is found with us in rocky barren ground, and upon old walls not uncommon. It was formerly in great credit as a pectoral ; but is now quite in disrepute.

The common branched coralline-moss (20) is one of the most useful plants of all the tribe of lichens. It is pretty frequent with us on our heaths, forests, and mountains. The northern regions afford it in abundance ; and there it is peculiarly and singularly useful. It is indeed the very support and foundation of all the Lapland œconomy, and without which the inhabitants could not sustain their rein-deer in the winter time. Linnæus tells us (1), that Lapland affords no vegetables in such plenty as this, and other of the lichens. Plains of several miles extent are totally covered over with it, as if with snow ; and where no other plant will even take root, this will thrive and be luxuriant. These dreary and inclement wastes, these *terræ damnatæ*, as a foreigner would readily call them ; these, are the Lapland fields and fertile pastures. On this lichen the rein-deer, those sources of all their wealth, feed in the winter time, when it is in its most flourishing condition, and no

(19) *Coralloides corniculis longioribus et rarioribus*. Dillen. Hist. Musc. p. 103. *Muscus corniculatus* Ger. p. 1372. Park. 1308. Raii Hist. I. p. 112. III. p. 28. *Lichenoides tubulosum cinereum minus crustaceum minusque ramosum* Raii Syn. 3. p. 67.

(20) *Coralloides montanum fruticuli specie ubique candicans* Hist. Musc. p. 107. *Lichen rangiferinus* Lin. Sp. Pl. 1153. *Muscus corallinus*. Tab. Ger. em.

(1) Flor. Lappon. p. 332.

other vegetable is to be had : with this too they will even become fat. The riches of the Laplanders consist in their number of these cattle : they are clothed with their skins, fed with their flesh, and from their milk they make both butter and cheese. Nature, by the inclemency of their seasons, has almost denied them the cultivation of their earth : they neither sow nor reap ; but live a perpetual migratory life, tending their flocks of rein-deer, upon which their whole care is centered and employed.

The milk of the rein-deer is very remarkably fat and rich : it tastes indeed like cow's milk, with which some butter, and a small quantity of fat or suet, has been intimately united. Dr. Haller (2) suspects, that this richness of the milk is owing to the animals feeding upon this moss. Most of the plants of this family are of an astringent quality, which indeed they manifest to the taste. This astringency of their food will doubtless contribute much to that effect.

The rein-deer are not the only animals that will feed upon the coralline moss. The Novaccolæ (3) gather vast quantities of it to fodder their oxen with in the winter. They take the opportunity of raking it together in the rainy seasons, when it is tough ; for in dry weather it easily crumbles into powder. This they moisten with a little water in the winter season when they use it, and find it excellent fodder.

(2) Enum. Stirp. Helv. p. 69. N°. 38.

(3) The Novaccolæ are a people originally sprung from the Finlanders : they fixed themselves in Lapland not long since, and traffick with the old inhabitants.

The coralline mosses are subject to great variation : and altho' there are several really distinct species, yet they run so into one another, that it is no easy matter to fix upon the real specific distinctions, in many instances. Some species are perfectly white ; others have the extremities of the branches reddish, some brown, and others almost black. The common coralline moss in Lapland not unfrequently grows to be several inches long, and even a foot high.

The tubular or hollow branched coralline mosses are not the only kinds upon which the rein-deer will feed. Almost all the lichens are abundantly more plentiful in those northern, than in these more southerly climates. There are several species with solid branches ; one, which Dillenius calls *The crisp warty Alpine coralloides* (4), which is almost as plentiful as the common sort, and is equally acceptable to those animals (5). It was before observed, that, in defect of these mosses, the black *mane usnea* is a substitute equally acceptable to those animals.

Another of the most remarkable and useful plants of this division is the *orchel* (6), or *argol*, as it is

(4) *Coralloides crispum et botryforme Alpinum* Hift. Musc. p. 114. *Lichen paschalis* Lin. Sp. Pl. *Lichenoides non tubulum cinereum ramosum totum crustaceum* Raii Syn. III. 66. N. 11. This moss is not common in England. Dr. Dillenius found it upon some of the mountains in Wales. It is found in many places on Charley-forest, Leicestershire.

(5) Flor. Lappon. N^o. 489.

(6) *Coralloides corniculatum fasciculare tinctorium fuci teretis facie* Dillen. Hift. Musc. p. 120. *Cladonia tophacea* Hill. Hift. Pl. p. 93. *Fucus capillaris tinctorius* Raii Hift. I. p. 74. *Lichen (Rocella) fruticulosus solidus aphyllus subramosus tuberculis alternis* Lin. Sp. Pl. 1154.

commonly

commonly called. This enters more into œconomical uses among us than any other of the whole genus. How considerable an article it forms in the dying trade, in which its uses are various and extensive, is very well known. Its tinging property has been known from ancient times; and some of our most celebrated botanic writers are of opinion, that it was used as a dye even in the days of Theophrastus. That father of botany mentions a *fucus*, which, he says, grew upon the rocks about the island of Crete; and that they dyed woollen garments of a purple, or rather a red colour, with it. It grows on the rocks by the sea-coast in many parts of the Archipelago, and in the Canary Islands; from whence we generally import it, as well as from the Cape Verd, which afford it in plenty. The demand for *orchel* is so great, that Mr. Hellot (7), of the Royal Academy of Sciences, informs us, they gather yearly, upon an average, from the isle of Teneriffe 500 quintals, which amounts to 25 ton weight; from the Canary Islands 400 quintals, from Forteventura 300, from Lance-rota 300, the same from Gomera, and from Ferro 800.

The way of manufacturing the *orchel* for the uses of dying, was for a considerable time a secret in few hands; but it is now done in London, and other parts of Europe, to great perfection. Mr. Ray, from Imperatus, gives a brief account of the process (8). Micheli has since delivered a more exact detail of it.

(7) L'Art de la Teinture des lains et des Etoffes de lain, Paris 1750, p. 543.

(8) Raii Hist. Plant. I. p. 74.

His, at least, seems to be the method (9), which the dyers at Florence used. From both these accounts, urine and pot-ash appear to be the principal ingredients used in extracting its colour.

Many other plants of this genus contain the same tephaceous matter as the *orchel*; and upon trial have been found to strike a good colour. Micheli, after he has related the preparation of the *orchel*, suggests the same thing; and M. Hellot, in the treatise before mentioned, tells us, there are many other mosses, which will give as good a colour as the *orchel*. In fact, he adds, that M. Bernard de Jussieu brought him some from the forest of Fontainebleau, which, upon experiments with urine and lime, took a purple colour. In the sequel of this memoir we shall point out some of these kinds. M. Hellot has given us a process, which he made use of for discovering whether any of these lichens would yield a red or purple colour. It is as follows: " Put about
 " two drachms of any of these lichens into a little
 " glass jar: moisten it well with equal parts of
 " strong lime-water, and volatile spirit of *sal ammo-*
 " *niac*: tie a wet bladder close over the top of the
 " vessel, and let it stand three or four days. At the
 " end of this time, if the lichen is likely to answer,
 " that small quantity of liquor, which you will find
 " in the glass, will be of a deep crimson red; and
 " the plant will retain the same colour when the li-
 " quor is all dried up. If neither the liquor nor the
 " plant have taken any colour, it is needless to make
 " any further trials with it." This process is simple

and easy, and well worth observation by all who are disposed to prosecute experiments of this nature : and indeed it is worth the trial, whether several lichens, which we have plentifully enough in England, would not answer in this respect.

3. Lichenes pyxidati.

Such as consist of a firm tough flexible matter, formed into simple tubular stalks, whose tops are expanded into the form of little cups.

This division contains the cup-mosses of authors ; the second order of *coralloides* of Dillenius ; great part of the first order of lichens in Haller ; the 7th, 8th, 9th, and 10th order in Micheli ; and the *lichenes schyphiferi* of Linnæus. Dr. Hill has constituted a genus intirely of these cup-mosses, under the name of *pyxidium*.

They are common with us on heaths, and other dry and barren places. Some of them are proliforous, even to the third degree, and form a very beautiful appearance. Some have tubercles on the edges of the cups, of a beautiful scarlet colour.

The cup-moss (10) was a long time in great and established use for coughs, and especially for the whooping cough in children ; for which it was long accounted a specific. To this end it was given in various forms. Gerard and Parkinson recommend

(10) *Coralloides schyphiforme tuberculis fuscis* Hist. Musc. 79.
Lichenoides tubulosum pyxidatum cinereum. Raii Syn. III. p. 68.
Pyxidium margine leviter serrato. Hill. Hist. Plant. p. 94.

the powder to be taken for several days together. Dr. Willis was particularly one of its patrons. He has given us (11) several forms for its exhibition, as that of the powder, a decoction, and a syrup from it.

The present practice has quite exploded it, and very justly perhaps, as in any degree specific in the above disorder. Nevertheless, it seems to have sustained that character with as great a reputation, and perhaps with as good a title to it, as almost any of the specifics of that age. It has been observed before, on another occasion, that this tribe of mosses have in general an astringent property; as such, the cup-mosses are consequently of a strengthening nature: it is no wonder, therefore, that they should be helpful in this disorder, merely as corroborants. That they were useful in some measure can scarcely be doubted; and our very eminent Dr. Huxham (12), in treating upon this obstinate complaint, seems to allow this of the cup-moss in preference to other idle specifics. Happily for us, the Peruvian bark supplies a remedy of infinitely more use, where such analeptics are required.

Dr. Lister, in some ingenious observations of his, printed in the Philosophical Transactions (13), touching colours and dyes, observes, that the scarlet heads of these mosses, upon the affusion of lye, will strike a purple which will stand.

(11) Willis Pharm. Rational. sect. I. cap. 6. *de tussi puerorum convulsiva*.

(12) De Aëre et Morbis epidemicis, p. 76, 77. vol. I.

(13) Lowthorp's Abridgment, vol. II. p. 660.

4. Lichenes crustacei.

Such as consist of a dry and friable matter, more or less thick, formed into flat crusts, very closely adhering to whatever they grow upon.

Some of the species of this division consist of an exceeding fine thin crustaceous, or rather, as Micheli calls it, farinaceous matter, the fructifications appearing in the form of tubercles. Others consist of a thicker scabrous crust, having the fructifications in the form of little cups, called *scutellæ*.

This division contains the first order of the *lichenoides* of Dillenius; the 5th, 6th, and 7th orders of Haller's lichens; the *lichenes leprosi* and *crustacei* of Linnæus; and several of the *placodium* of Hill.

The species are numerous, and most of them very common on rocks, stones, old walls, the bark of trees, old pales, &c. which are commonly covered over with them, in undisturbed places. They form a very agreeable variety, and some of them have a very elegant appearance.

Dr. Dillenius describes a species of this order, which he found upon the tops of the mountains in Caernarvonshire in Wales; and which the inhabitants told him they used as a red dye, and found it preferable to the cork, or arcel, which they call *kenkerig*. He has intitled it, in English, *The white tartareous scarlet-dying lichenoides* (14). He is of opi-

(14) *Lichenoides tartareum tinctorium candidum tuberculis atris*. Hist. Musc. p. 128.

nion, that this is the moss which Martin mentions, in his account of the Western Islands of Scotland, under the name of *corkir*; with which the inhabitants of the island of Sky dye a scarlet colour. They prepare it by drying, powdering it, and then steeping it for three weeks in urine. Linnæus queries whether this moss be not the same as his *lichen calcareus* (15); a species so peculiar to limestone rocks, that where-ever that stone occurs among others, it may be distinguished at the first view by this moss growing upon it. This is a singularity which Dr. Dillenius has not mentioned in his moss: on the other hand, Linnæus does not mention any tinging property in his.

The *pérèlle d'Auvergne*, or *orseille de terre*, of the French, belongs to this order of lichens, and is called by Dillenius (16) *The crayfish-eye-like lichenoides*. It is gathered in large quantities in the province of Auvergne, and is used as *orchel*; to which however it is greatly inferior. They prepare it with lime and urine; and were acquainted with its use as a dye long before the Canary weed was known (17) to them; and it is at this day in more common use than the *orchel*. We have it frequent with us upon old walls, rocks, and stones; but it is to be had in larger quantities in several other parts of Europe.

(15) *Lichen (calcareus) leprosus candidus tuberculis atris* Spec. Plant. 1140.

(16) *Lichenoides leprosum tinctorium scutellis lapidum Caneri figura* Hist. Musc. 130. *Lichenoides crustaceum et leprosum scutellare cinereum*. Raii Syn. p. 70.

(17) Tournefort's *Voyage to the Levant*, Eng. edit. Lond. 1741. in 8°. vol. I. p. 248.

The mealy tartareous *lichenoides* (18) with brown dishes, forms an article of trade with the people of West Gothland. They manufacture a beautiful red dye from it, which they sell under the name of *byt-telet* (19). Dr. Hill says we have this moss abundantly in Leicestershire and Warwickshire.

The Welch make a red dye, with urine, from another moss of this order, which Dillenius describes (20) by the name of *The large leprous lichenoides with yellow plates*. These are not the only species, which are endowed with a tinging quality: other kinds have been observed to give a red or purple colour to paper in which they have occasionally been inclosed. Doubtless several would, upon sufficient trials, be found to answer equally well with the *orchel*.

With regard to these crustaceous mosses in general, it is highly worthy our regard, that in the œconomy of nature they answer singular and important uses. To an unobserving eye, no class of vegetables may appear more insignificant, or less adapted to advantageous purposes in the creation, than these. This vulgar estimation of things is frequently erroneous; and it is certainly so in the instance before us. These minute and seemingly insignificant mosses serve, under some circumstances, to valuable purposes. No sooner is a rock left bare by the sea, but these lichens lay the foundation for its future fertility. Their seeds,

(18) *Lichenoides tartareum farinaceum scutellarum umbone fusco*. Hist. Musc. 132. *Placodium bracteis majusculis limbo albo cinctis* Hill. Hist. Pl. p. 97.

(19) Flor. Suec. Ed. II. p. 407.

(20) *Lichenoides crustaceum et leprosum acetabulis majoribus luteis limbis argenteis* Raii Syn. p. 71. N. 46. Hist. Musc. p. 132.

which are presently brought thither by the winds, soon cover it all over. These corrupting, presently afford a soil sufficient to nourish other smaller mosses; which, in their turn, form one deep enough for larger plants and trees; and thus the rock becomes a fertile island (21).

5. Lichenes foliacei scutellati.

Such as consist of a more lax and flexible matter, formed into a foliaceous appearance, having the parts of fructification in the form of scutellæ.

Some of the plants of this division are interspersed with the former in some of the systems of botanic authors. In general this division contains the whole first series of the second order of *lichenoides* in Dillenius; the first division of the second series, and the latter part of the second division, of the same: it comprehends the *lichenes imbricati* and *umbilicati* of Linnæus; and many of the *placodium* of Hill.

The plants of this order are many of them not less common in England than the foregoing, on rocks, stones, old pales, trees, &c. Some adhere very closely to what they grow upon, and seem to be only foliaceous about the edges: others adhere but loosely, and are much expanded and divaricated, so as to form something like ramifications.

It was remarked, from Linnæus's observation, that one of the crustaceous lichens was scarcely ever found growing but upon limestone rocks. On the contrary,

(21) Vide Œconom. Natur. in Amæn. Acad. vol. II. p. 17.
the

the same author has observed of a foliose lichen belonging to this order, that it will thrive on all kind of rocks but limestone rocks. This species (1) Dillenius calls *The common grey-blue pitted lichenoides*. It is very common with us upon trees, old wooden pales, &c. as well as upon rocks and stones. It is the *usnea cranii humani* of the old *materia medica*. Linnæus adds, that it will dye a purplish colour.

Hither likewise must be referred the cork or arcel (2), which is used by the Scotch, and others, to dye a purple or scarlet colour. The preparation of it is by powdering, and making it into a mass with urine. Parkinson tells us (3) the poor people in Derbyshire scrape it from the rocks, and make the same use of it. Mr. Ray (4) adds to this account, that the Welch, who call it *kenkerig*, have long been acquainted with this property, and have it in common use. The colour from this moss is but very dull; but if the same methods were taken to improve it, as have been with the *orchel*, it would undoubtedly be rendered much better, and more durable. Linnæus relates (5), that there is an immense quantity of this moss about the rocks of the

(1) *Lichenoides vulgatissimum cinereo-glaucum lacunosum et cirrosum* Hist. Musc. p. 88. *Lichenoides crusta foliosa superne cinereo-glaucæ, inferne nigra et cirrosa scutellis nigricantibus*. R. Syn. p. 72.

(2) *Lichenoides saxatile tinctorium foliis pilosis purpureis* Raii Syn. p. 74. N°. 70. Hist. Musc. p. 185. *Lichen petræus purpureus Derbiensis* Park. Theat. p. 1315. *Lichen omphalodes* Lin. Spec. Pl. 1143.

(3) Park. Theat. Botan. p. 1315.

(4) Raii Hist. Plant. p. 116.

(5) Flor. Lappon. p. 343. V.

isle of Aland in the Baltick ; where the good women themselves make a yellow dye with it from a simple decoction of the plant, without the addition of any saline article. He adds, that those, who would heighten the colour, add a small quantity of *roucou* (*) to the decoction.

Professer Linnæus tells us, that the Gothlanders manufacture a yellow dye from the common curled *lichenoides* with yellow leaves and plates (6). He adds, that it is a celebrated medicine in the esteem of the country people, as a specific in the jaundice (7). Helwingius, in the Supplement to the *Flora Prussica*, affirms, that this moss will tinge paper and linen of a lively carnation colour, which too will stand the test of being exposed to the open sun for a long time without fading. It seems very probable, however, that he must mean some other plant of this genus, as Dillenius tells us he made the experiment unsuccessfully.

Sweden affords a moss of this order, which, as far as hitherto appears, seems to be unknown to former botanists, and which Linnæus says will dye a deep purple colour (8).

(*) Otherwise called *arnotto*.

(6) *Lichenoides vulgare sinuosum foliis et scutellis luteis*. Hist. Musc. p. 180. *Lichenoides crusta foliosa scutellata flavescens*. Raii Syn. p. 72. N°. 59.

(7) Flor. Suec. Ed. II. p. 416. N°. 1093.

(8) Linnæus has intitled this moss *Lichen (stygicus) imbricatus, foliis palmatis incurvis atris*. Fl. Suec. I. 949. Spec. Plant. 1143. Fl. Suec. II. N°. 1079.

6. Lichenes erecti ramosi plani.

Such as consist of a firm tough matter, disposed into flat and thin ramifications growing erect, and bearing their scutellæ upon the edges, surfaces, and at the extremities.

This division comprehends the flat branched tree-mosses of authors; many of the fourth order of Haller's lichens; the first part of the second division of series the second in Dillenius; and the *platisma* of Hill.

The plants of this division grow upon old trees, especially in thick and unfrequented woods; some of them upon rocks: they are many of them extremely common in England upon all kinds of trees. As they were some of the most obvious, so they were some of the first lichens noticed by the old writers, by whom they were called *lichenes arborum*.

The mosses of this order were substituted in the room of the *usnea* in the composition of the *pulvis cyprius*. The very species, which was most frequently used for this purpose, was the channel-leaved *lichenoides* of Dillenius (9), on account of its being easily reduced into a fine powder, of a good white colour. Nevertheless, others are undoubtedly as well adapted to the same purposes: and, if it was of importance

(9) *Lichenoides coralliforme rostratum et canaliculatum*. Hist. Musc. 170. *Lichenoides arboreum ramosum angustioribus cinereo-virescentibus ramulis*. Raii Syn. 75. *Lichen calicaris* Lin. Spec. Plant. 1146.

enough to employ them to any purposes of the like nature in our own country, they might be procured in sufficient plenty.

One of the plants of this order is applicable to the same uses as the Canary-weed, and is reckoned not much inferior to it; and as it is found in the same places, it is very often packed up with it in considerable quantities. Dillenius calls it *The flat dyers lichenoides with longer and sharper horns* (10). It is truly and properly a plant of the lichen genus, tho' the older writers of the last century called it a fucus. They were led into this mistake by its having flat ramifications, and from its growing on the rocks by the sea side. It is found in the East Indies upon trees, and is frequent on the coasts of the Mediterranean, as well as about the Canary Islands.

7. Lichenes peltati.

Such as consist of a tough or coriaceous matter, disposed into a foliaceous appearance; on the edges of which, in general, the parts of fructification are placed, in the form of flattish oblong bodies, in these mosses called shields or pelts.

This division contains the third series of the second order of Dillenius's *lichenoides*; the *lichenes coriacei* of Linnæus; and several of the *placodium* of Hill.

That celebrated and well-known plant, the ash-

(10) *Lichenoides fuciforme tinctorium corniculis longioribus et acutioribus*. Hist. Musc. 168. *Platysma corniculatum*. Hill Hist. Plant. 90. *Lichen fuciformis* Lin. Sp. Pl. 1147.

coloured ground liverwort (11) of Ray belongs to this order. It is very common all over England on dry and barren ground ; and indeed almost all Europe, and America too, seems to afford it in sufficient plenty, as we find it observed by almost all the the botanic writers since Ray, who was one of the first that described it.

The earliest account we have of its use for the bite of a mad dog is in the Philosophical Transactions (12), from Mr. Dampier, in whose family it had been a secret for a number of years. It was communicated first to Sir Hans Sloane, as a kind of fungus, or Jew's-ear ; and, at the request of Dr. Mead, was some years afterwards received into the London dispensatory. Scarce any of the boasted specifics of former ages ever acquired so great reputation as this plant has done in modern times, for its prevalence against the bite of a mad dog ; and the patronage of the late learned Dr. Mead made it sufficiently known throughout all the world. Happy would it be indeed, if it fully deserved the high encomiums, which have been bestowed upon it. A great and eminent physician (13) has doubted its efficacy at all in such cases ; and it is well known, that Boerhaave even laughed at it. Dr. Mead had certainly an high opinion of it : he tells us it never failed, thro' the course of thirty years experience, where it was duly given

(11) *Lichenoides digitatum cinereum lactuæ foliis sinuosis* Dillen. Hist. Musc. 200. *Platysma sinuosum scutellis ovato-rotundis* Hill Hist. Pl. 89. *Lichen caninus* Lin. Sp. Pl. 1149.

(12) See Lowthorp's Abridgment, vol. III. p. 284.

(13) Dr. Van Swieten. See Comment. in Boerh. Aphor. §. 1147.

before the *hydrophobia* came on (14). Later instances have shewn, that it is not infallible; and Dr. Van Swieten's supposition is but too likely to prove true. It must be confessed, that Dr. Mead's exhibition of it seems too much complicated with other means to leave room for judging fully of its real efficacy; and it may really be questioned, whether bleeding, pepper, and cold-bathing, have not had more to do in the case than the lichen.

The *muscus pulmonarius officinarum* (15), tree-lungwort, or oak-lungs, belongs to this order. It is found about old oaks, and upon rocks and stones overgrown with moss, in many of our thick woods in England; but not in any great plenty.

Few, perhaps, of the antiquated simples were in more repute, in their day, than this plant. It was celebrated for ages, on account of its supposed prevalence in pulmonary complaints of almost all kinds; and yet, upon inquiry into the original of its use in such cases, it would probably appear, that it arose more from a fancied resemblance they found in the plant to the lungs themselves, than from any real and well-grounded proofs of its efficacy. As a gentle astringent, like most other species of the family, it would doubtless contribute to relieve in many cases where the lungs were affected, as in *hæmoptoës*, and some others: but it does not seem, by any means, to deserve that high character in medicine which has been given to it.

(14) Mechanical Account of Poisons, ed. 4th, p. 156.

(15) *Lichenoides pulmonium reticulatum vulgare marginibus peltiferis* Dill. Hist. Musc. 212. *Lichenoides peltatum arboreum maximum*. Raii Syn. p. 76. *Musc. pulmonarius* C. B.

The people in Herefordshire, where this moss is called *rags*, dye their stockings of a brown colour with it. This is done by a very strong but simple decoction in water, and the colour stands well (16).

The fine green *lichenoides* with black warts (17), is a celebrated medicine, and in very frequent use, with the country people about Upsal, for the thrush in children: to this end they give an infusion of it in milk. A medicine of this kind is of great importance in those countries, where that disorder occurs much more frequently than with us (18). It is not received into the Swedish dispensatory; but is known however in the shops, under the name of *muscus cumatilis*. We have it not in England; and Dillenius found it but in one place about Geissen: in the woods of Sweden it is more plentiful. A singular case, which is related in the *Amœnitates Academicæ* (19), has given rise to an opinion of its usefulness in the worms also. The case briefly was this: A country girl had, for near half a year, complained of excruciating pains in her stomach and bowels, which were attended with vomiting, anxiety, and great watchfulness. All that had been prescribed for her by Professor Linnæus and others, who took her case for the worms, proved altogether fruitless. Being afterwards left to the care of her neighbours and relations, some good women gave her a decoction of this moss, which the Uplanders call

(16) Dillen. Hist. Musc. p. 213.

(17) *Lichenoides digitatum læte virens verrucis nigris notatum.* Ibid. p. 207.

(18) Boerhaav. Aphorism. §. 982.

(19) Vol. II. p. 69. *De Tœnia.*

elfnefwer. After ſhe had taken it a few days, ſhe vomited up fix or ſeven roundiſh worms, and was cured. Theſe were found, upon examination, to be the maggots of a kind of brown bee-fly, deſcribed by Mr. Ray (20), and by Linnæus (1).

However inſufficient this hiſtory may be, to prove the uſefulneſs of this plant as a vermifuge, it will at leaſt ſerve to exemplify this fact; namely, that other animals of the infect kind, beſides the *tenia*, *lumbrici*, and *ascarides*, may ſubſiſt a long time in the *primæ viæ* of the human body, and be the cauſe of great diſturbances therein (2).

Neceſſity is frequently the parent of the moſt uſeful and important diſcoveries: and the uſes to which a plant of this order is appropriated by the natives of Iceland, is a ſtanding proof of the truth of this obſervation. That climate will ſcarcely permit the cultivation of any kind of grain; but the want of it is in a great meaſure happily ſupplied by the eryngo-leaved *lichenoides* (3), which is abundant in the northern regions; and in that iſland particularly the natives have long been acquainted with the methods

(20) *Musca apiformis, tota fuſca, cauda obtuſa, ex ejula caudata in latrinis degente orta*. Raii Hiſt. Inſect, p. 272.

(1) Faun. Suecica, N°. 1084.

(2) See two caſes nearly of this kind obſerved by Dr. Liſter. Lowthorp's Abridgment, vol. III. p. 135.

(3) *Lichenoides rigidum eryngii folia referens* Dillen. Hiſt. Muſc. p. 209. Raii Syn. p. 77. *Lichen foliis oblongis laciniatis marginibus conniventibus ciliaribus*. Flor. Lapon. Hall. Helv. 75. *Lichen (iſlandicus) foliaceus adſcendens laciniatus marginibus elevatis ciliaribus* Lin. Flor. Suec. I. 959. II. 1085. Mat. Med. N°. 493. Spec. Plant. 1145.

of applying it both to the purposes of food and of phyfic.

Ray has long since informed us (4), from Bartholine, that in the spring time, while it is young, it will purge; in consequence of which it is used as common spring phyfic. This quality it loses in a short time; and what serves for phyfic in the spring, is converted the remaining part of the year into food. They collect large quantities of it, grind it into meal, and make both pottage and bread of it. It is in common use not only with the islanders, but in several parts of Sweden also, where it is found to be a very appropriate diet in phthifical cases (5). These accounts of the excellent use of this lichen correspond perfectly well with the last accounts of it in Mr. Horrebow's Natural History of Iceland, just published; and which I shall take the liberty of transcribing, as follows: "There is another herb, " called *muscus catharticus islandiæ*, or mountain- " grafs, which they cook up into a delicate dish. I " have often eat of it; at first out of curiosity, but " afterwards for its palateableness and wholesomeness. " The excellent qualities of this herb are described " in the Memoires of the Society of Arts and Sci- " ences in Sweden. It grows in great abundance; " and those that live near the places, where it is " found, gather great quantities for their own use, " and to send to market. People that live at a " great distance will send and fetch horse-loads " away. Many use no meal or flour at all, when

(4) Raii Hist. Plant. p. 114.

(5) Flor. Lappon. N^o. 445.

“ they are stocked with this herb, which in every respect is good and wholesome food” (6).

This moss is not very common in the southern countries of Europe. England affords it but very sparingly. Mr. Newton and Dr. Dillenius found it in Wales; Sibbald, in Scotland. It is frequent on the Alps of Switzerland; and Dr. Haller mentions it in his *Iter Hercynium*. Sweden and Lapland have it in plenty: and on account of its great abundance and usefulness in Iceland, Bartholine, and after him others, called it *muscus islandicus*.

CONCLUSION.

I cannot help remarking, by way of conclusion, that we have in this genus of plants a convincing instance of the utility which may result from the study of natural science in general, and even of its minuter and hitherto most neglected branches. From a view of the foregoing memoir it is evident, I presume, that the æconomical uses of the lichens, in the various parts of the world, are already very considerable and important: and altho' it does not appear, that the sensible qualities of any of them, or the experience of former ages, will warrant our ascertaining any singular powers to them in a medicinal way, yet posterity will doubtless find the means of employing them to many valuable purposes in human life to us unknown.

It will at once be acknowledged, that the vegetable kingdom supplies us with the far greater share of the

(6) Horrebow's Natural History of Iceland, p. 36.

necessaries,

necessaries, the conveniencies, and even the elegancies, of life. The cultivation of that knowlege, which leads to the investigation of its subjects, cannot, therefore, but be highly useful and necessary : and altho' the bare science of natural knowlege is of itself worthy of applause, yet it ought to be considered, in reality, as the necessary means only of applying the subjects of nature's kingdoms to their true ends and purposes, the service of mankind. To know and distinguish, by determined and specific characters, even but a small share of that amazing multitude of objects, with which the great Parent of nature has furnished our globe, is a task far more than equal to the duration of human life. To investigate and ascertain their various qualities and uses is equally arduous and impracticable. While the naturalists, therefore, are employed in distinguishing the forms of things, let others exert the united efforts of genius and application to investigate their various properties and uses. I need not say the field for both is boundless : it doubtless will be so for ages yet to come. The hopes of discovering some latent property, which may turn out to the advantage of his fellow-creatures, will animate the man, whose mind is truly formed for relishing the pleasures of natural science ; and however the result may be, the inspection and contemplation of nature's productions will ever afford that satisfaction, which will amply repay him for his trouble. The minuter, and, as they are commonly estimated, the most abject and insignificant things are not beneath our notice ; and an attentive mind will readily conceive how much farther, and more extensively useful, every branch of nature's kingdom
may

may yet prove in the œconomy of human life. The man, therefore, whom a genius and love for natural history has allured into its pursuits, and whose leisure permits his gratification in such researches, if he is not happy enough to be crowned with success, at least deserves it, and merits the thanks of his fellow-creatures for his application and diligence.

XCII. *An Account of the fossile Bones of an Allegator, found on the Sea-shore, near Whitby in Yorkshire. In a Letter to John Fothergill, M. D. from Capt. William Chapman.*

Whitby, 20th of 1st mo. 1758.

Read May. 4,
1758.

A Few days since we discovered on the sea-shore, about half a mile from this place, part of the bones of an animal, appearing as in the annexed figure (*See TAB. XXII.*). The ground they laid in is what we call allum-rock; a kind of black slate, that may be taken up in flakes, and is continually wearing away by the surf of the sea, and the washing of stones, sand, &c. over it every tide.

The bones were covered five or six feet with the water every full sea, and were about nine or ten yards from the cliff, which is nearly perpendicular, and about sixty yards high, and is continually wearing away, by the washing of the sea against it; and, if I may judge by what has happened in my own memory,